II. TABLE OF CONTENTS

III. REMARKS

Claims 1-17 and 19-110 are pending. However, claims 7-17, 19-21, 33-62, 67-80, 85-89, 93-97, 99-101, 103-105 and 107-109 have been withdrawn, and claims 1-6, 22-32, 63-66, 81-84, 90-92, 98, 102, 106 and 110 have been examined.

By this paper, claim 1 has been amended, and new claims 111-114 have been added. More specifically, independent claim 1 has been amended to recite the relationship "$62 \leq [Cu]- 0.5[Sn] \leq 90$" as supported by original claim 1. Claim 1 has also been amended to recite "0.6 to 3 mass% of Sn" as supported on page 24, lines 17-22, of Applicant's specification as originally filed.

New independent claim 111 incorporates subject matter from previous claim 1, and additionally recites "the copper alloy material comprises a composition that does not include Mn and that does not include Ni" as supported by alloy nos. 101 to 206, 302, 303, 305, and 401 to 404 of Applicant's Table I (See ¶ [0080]), and by alloy nos. 525 to 702, 704, 705 and 801-805 of Applicant's Table III (See ¶ [0082]). Independent claim 111 further incorporates the relationship "$62 \leq [Cu]-0.5[Sn]-3.5[Si]-1.8[Al]+[Mn]+[Ni] \leq 90$" supported by claim 3. However, because the composition does not include [Mn]+[Ni], then [Mn] = [Ni] = 0, so that "$62 \leq [Cu]-0.5[Sn]-3.5[Si]-1.8[Al]+[Mn]+[Ni] \leq 90$" becomes "$62 \leq [Cu]-0.5[Sn]-3.5[Si]-1.8[Al] \leq 90$." Claim 111 also recites "0.6 to 3 mass% of Sn" as supported on page 24, lines 17-22, of Applicant's specification as originally filed.

New independent claim 112 is supported by claim 1, and additionally recites "the copper alloy material has an Al-Sn surface coating or a Si-Sn surface coating" as supported on page 35, lines 3-11, of Applicant's specification as originally filed.

New claim 113 depends upon claim 1, and additionally recites that "the phase structure does not include a β phase, and the γ phase is arranged into fractured spherical fragments" as supported by page 38, lines 14-22, of Applicant's specification as originally

filed. New claim 114 depends upon claim 1, and additionally recites that "the phase structure includes a β phase, and the γ phase and the β phase are arranged into fractured spherical fragments" as supported by page 38, lines 12-22, of Applicant's specification as originally filed.

The present amendment adds no new matter to the above-captioned application.

A. The Invention

The present invention pertains broadly to a copper alloy material in wire or bar form for forming a netted structure used in seawater, such as may be exposed to harsh conditions such as water or waves running at high speed and rubbing. Thus, in accordance with an embodiment of the present invention, a copper alloy material is provided that includes features recited by independent claim 1. In accordance with another embodiment of the present invention, a copper alloy material is provided that includes features recited by independent claim 111. In accordance with yet another embodiment of the present invention, a copper alloy material is provided that includes features recited by independent claim 112. Various other embodiments, in accordance with the present invention, are recited by the dependent claims.

An advantage provided by the present invention is that a copper alloy material is provided wherein the alloy is corrosion resistant and may be used in seawater.

B. The Rejections

Claims 1-6, 22-32, 63-66, 81-84, 90-92, 98, 102, 106 and 110 stand rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement.

Claims 1-6, 22-32, 63-66, 81-84, 90-92, 98, 102, 106 and 110 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Oishi et al. (JP 10-152735, and English Machine translation, hereafter collectively the "Oishi Document") in view of Furukawa Electric (JP 49-040226 A, Abstract only, hereafter, the "JP'266 Document") and in view of Hasegawa (JP 61-048547, hereafter the "Hasegawa Document," along with the English Translation of JP 61-048547, provided by the United States Patent and Trademark Office (USPTO) with the Final Office Action of October 1, 2010[1]).

Applicant respectfully traverses the Examiner's rejections and requests reconsideration of the above-captioned application for all of the following reasons.

C. Applicant's Arguments

In view of the present amendment, claims 1-6, 22-32, 63-66, 81-84, 90-92, 98, 102, 106 and 110-114, as amended, are in compliance with 35 U.S.C. § 112.

The Examiner contends that the claimed formula "$62 \leq [Cu]-0.5[Sn]-3.5[Si]-1.8[Al] \leq 90$" is not supported by Applicant's original disclosure (Office Action, dated October 1, 2010, at 3, lines 3-4). The Examiner's contention is incorrect for the following reasons.

The Federal Circuit has ruled that to satisfy the written description requirement of 35 U.S.C. § 112, first paragraph, an Applicant must show "possession" of the claimed invention by words, structures, figures, diagrams and/or formulas that fully set forth the claimed invention although the exact terms need not be used *in haec verba*. Lockwood v. American Airlines Inc., 41 U.S.P.Q.2d 1966, 1961 (Fed. Cir. 1997). Whether a disclosure satisfies the written description requirement is a question of fact, and the Examiner has the burden of establishing, by evidence, or reasons, why a person of ordinary skill in the art would not have

[1] The English Translation of JP 61-048547 provided by the USPTO is hereafter referred to as the "English Translation of Hasegawa"), and is refilled as "Exhibit A1."

recognized in the applicant's disclosure a description of the invention defined by the claims. In re Wertheim, 191 U.S.P.Q. 90, 97 (C.C.P.A. 1976).

In this case, Applicant's original Tables I and III contain numerous alloys that do not contain Mn and that do not contain Ni. Therefore, Applicant's original disclosure provides adequate support for a "composition that does not include Mn and that does not include Ni" as recited by claim 111.

As admitted by the Examiner (Office Action, dated October 1, 2010, at 3, lines 5-7), Applicant's original disclosure provides support for a composition that satisfies the relationship $62 \leq [Cu]-0.5[Sn]-3.5[Si]-1.8[Al]+[Mn]+[Ni] \leq 90$. Claim 111 incorporates the relationship "$62 \leq [Cu]-0.5[Sn]-3.5[Si]-1.8[Al]+[Mn]+[Ni] \leq 90$;" however, because [Mn] = [Ni] = 0, the relationship simplifies to "$62 \leq [Cu]-0.5[Sn]-3.5[Si]-1.8[Al] \leq 90$." In other words, for a composition that does not include Mn and Ni, then [Mn] = [Ni] = 0, and the relationship $62 \leq [Cu]-0.5[Sn]-3.5[Si]-1.8[Al]+[Mn]+[Ni] \leq 90$ and the relationship $62 \leq [Cu]-0.5[Sn]-3.5[Si]-1.8[Al] \leq 90$ are the exact same relationship.

For all of the above reasons, new independent claim 111 is fully supported by Applicant's disclosure as originally filed. Therefore, new claim 111 is in compliance with the written description requirement of 35 U.S.C. § 112.

i. The Section 103 Rejection

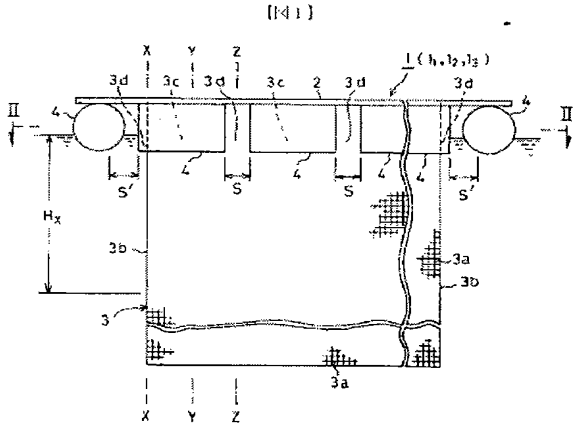
A prima facie case of obviousness requires a showing that the scope and content of the prior art teaches each and every element of the claimed invention, and that the prior art provides some teaching, suggestion or motivation, or other legitimate reason, for combining the references in the manner claimed. KSR International Co. v. Teleflex Inc., 127 S.Ct. 1727, 1739-41 (2007); In re Oetiker, 24 U.S.P.Q.2d 1443 (Fed. Cir. 1992). In this case, the Examiner has failed to establish a prima facie case of obviousness against amended claims 1-6, 22-32,

63-66, 81-84, 90-92, 98, 102, 106 and 110-114 because the Oishi Document, the JP'266 Document, and the Hasegawa Document, when taken either alone or in combination, fail to teach or suggest each and every claimed limitation, recited as in the claims.

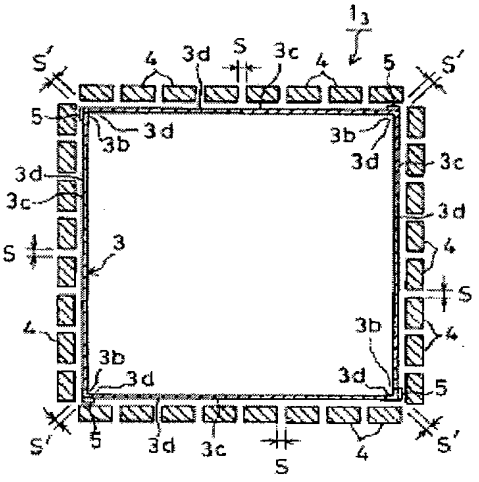
ii. The Oishi Document

JP 10-152735 (hereafter, the "JP'735 Document"), and corresponding JPO Machine English translation (hereafter, the "JP'735 Machine Translation"), which are collectively referred to as the "Oishi Document," disclose a "seawater corrosion resisting copper-base alloy, cultivation net for fishes, and crawl for cultivation of fishes" (See Patent Abstracts of Japan corresponding to JP 10-152735). More specifically, the JP'735 Document discloses a crawl for cultivation of fishes constituted by suspending a cultivation net (3) for fishes with plural floats (4) and attaching sacrificial anodes (5) composed of zinc plates to respective corner parts (3b) of the cultivation net (3), respectively (See, e.g. Patent Abstracts of Japan corresponding to JP 10-152735). Figures 1 and 4 of the JP'735 Document show these features, and are reproduced below for convenience.

【図１】



【図４】



The cultivation net (3), according to the JP'735 Document, is constituted of a wire made of seawater corrosion resisting copper-base alloy having a composition consisting of, by weight, 62.0-69.0% copper, 0.2-1.0% tin, 0.02-0.15% antimony, one or two elements selected from 0.02-0.15% phosphorus, 0.1-1.0% nickel, and 0.05-0.8% iron, and the balance zinc with inevitable impurities (See Patent Abstracts of Japan corresponding to JP 10-152735). The mutual spacings S, S' between neighboring floats (4), (4') are regulated to ≤30cm, respectively, and the positions of respective sacrificial anodes (5) are located at a depth of 10-50cm from the surface of the sea, respectively (See Patent Abstracts of Japan corresponding to JP 10-152735).

The JP'735 Document focuses more on the net structure for fish cultivation than on the copper alloy used to make the net structure as evident from the Abstract and ¶¶ [0019] to [0028] of the JP'735 Document, (See, e.g., ¶¶ [0019] to [0028] of the JP'735 Machine Translation). Because the effect of ocean waves is not controlled by the material alloy fundamentally, the JP'735 Document discloses that the distance between each float of the net be less than 30 cm (JP'735 Document, ¶¶ [0020] to [0022]), and that oxide layers are formed on the material surface by placing several sacrificial anodes (5), made of zinc or aluminum, which are attached to the net in order to prevent the wire material diameter from decreasing (JP'735 Machine Translation, ¶¶ [0023] to [0027]). Further details regarding the net structure disclosed by the JP'735 Document are included in ¶¶ [0030] to [0044], and Figures 1 to 4.

The present invention, on the other hand, pertains to a "copper alloy material in wire or bar form," such as is used to form a netted structure, such as a fish cultivation net. As conceded by the Examiner (Office Action, dated October 1, 2010, at 4, line 8; and Office Action, dated February 23, 2010, at 6, line 11), the JP'735 Document does not teach, or even suggest, (i) "<u>one or more elements selected from the group consisting of 0.02 to 1.5 mass% of Al, and 0.02 to 1.9 mass% of Si</u>" as recited by independent claims 1, 111 and 112. However,

this is not the only deficiency in the disclosure of the JP'735 Document, which also does not teach, or even suggest, (ii) "the copper alloy material forms an Al-Sn coating or a Si-Sn coating when in seawater" as recited by claims 1 and 111, and (iii) "the copper alloy material has an Al-Sn surface coating or a Si-Sn surface coating" as recited by claim 112. The JP'735 Document also does not teach, or suggest, (iv) "the copper alloy material has a phase structure including an α phase, a γ phase, and a δ phase, and the total area ratio of the α, γ, and δ phases is 95 to 100%" as recited by claims 1, 111 and 112, and it does not teach or suggest the phase structure recited by new claims 113 and 114.

a. The Examiner's Inherency Argument with Respect to Metal Phase Structure is Untenable and Should be Withdrawn

As admitted by the Examiner (Office Action, dated February 23, 2010, at 4, lines 8-9), the JP'735 Document does not teach, or suggest, (iv) "the copper alloy material has a phase structure including an α phase, a γ phase, and a δ phase, and the total area ratio of the α, γ, and δ phases is 95 to 100%" as recited by claim 1. The Examiner previously argued that the Oishi Document inherently disclosed the claimed phase structure because

> "Oishi teaches an overlapping composition and a substantially similar method of preparation by melt-solidification, rolling, casting as shown in instant pars. 17, 21, 20, etc."
> (Office Action, dated February 23, 2010, at 4, lines 9-12),

and cited MPEP § 2112.01 in alleged support of this contention. Applicant argued that the Examiner's inherency argument is flawed, and should be withdrawn, for all of the reasons evinced in Amendment (D), filed June 23, 2010, at 27, line 1, to 28, line 17. The Examiner concedes that JP'735 Document does not inherently possess the claimed phase structure (Office Action, mailed October 1, 2010, at 6, lines 1-2).

b. The Surface Coating Limitations are not "Product-by-Process Limitations;" Therefore, the Examiner Should Consider Them

The Examiner contends that the limitation "the copper alloy material forms an Al-Sn coating or a Si-Sn coating when in seawater" is a "product-by-process" limitation (Office Action, dated October 1, 2010, at 6, lines 14-15). The Examiner's contention is flawed because the limitation wherein "the copper alloy material forms an Al-Sn coating or a Si-Sn coating when in seawater" is a property limitation of the copper alloy material. The Federal Circuit has ruled that a claimed composition may be defined, in part, by property limitations. Du Pont v. Phillips Petroleum Co., 7 U.S.P.Q.2d 1129, 1133 (Fed. Cir. 1988). On the other hand, the Federal Circuit has held that a "product-by-process" limitation is 'one in which the product is defined at least in part in terms of the method or process by which it is made.' Smithkline Beechham Corp. v. Apotex Corp., 439 F.3d 1312, 1315 (Fed. Cir. 2006) *quoting* Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 158n., 109 S.Ct. 971, 103 L.Ed.2d 118 (1989). It is evident on its face that the limitation wherein "the copper alloy material forms an Al-Sn coating or a Si-Sn coating when in seawater" is not a product-by-process limitation.

The disputed limitation is a property limitation. As would be instantly appreciated by those of ordinary skill in the art, the limitation wherein the claimed copper alloy material forms an Al-Sn coating or a Si-Sn coating when placed in seawater pertains to the behavior of the alloy under certain circumstances. The behavior of the copper material alloy under circumstances, namely, that the alloy forms a protective coating on its surface when placed in seawater, defines a property of the copper alloy material. Claims 1 and 111 do not describe a method for making the claimed copper alloy material or its composition.

With respect to claim 112, the issue is moot because this claim recites "the copper alloy material has an Al-Sn surface coating or a Si-Sn surface coating," which is

a pure product limitation, and neither a property limitation nor a product-by-process limitation.

For all of the above reasons, the limitation pertaining to a "copper alloy material [that] forms an Al-Sn coating or a Si-Sn coating when in seawater" is a property limitation of the copper alloy material, and not a product-by-process limitation. Thus, when this property is properly construed, and considered, the Examiner should conclude that the Oishi Document completely fails to teach, or suggest, a "copper alloy material [that] forms an Al-Sn coating or a Si-Sn coating when in seawater" as recited by claims 1 and 111.

c. Miscellaneous Comments Regarding the Oishi Document

The Oishi Document discloses that the distance between each float of the net should be less than 30 cm and/or sacrificial anodes should be placed when the net is subjected to harsh conditions, such as occurs with high-speed moving ocean currents, waves and abrasion, because Oishi's alloy does not, by itself, possess enough corrosion-resistance. On the other hand, the copper alloy material, in accordance with the present invention, can, by itself, endure such harsh conditions due to the formation of a Sn-Al surface coating, or a Sn-Si surface coating, that occurs over the surface of the wires and protects the wires. The copper alloy material, in accordance with the present invention, is also able to endure the harsh conditions due to the other features of the invention, such as the alloying relationships and the phase structure. Those skilled in the art would not expect the coatings of Sn-Al and Sn-Si to form under the harsh conditions, and they certainly would not expect that these coatings should have substantial effects on corrosion resistance under the harsh conditions. These effects are supported by examples compiled in Tables 1 and 2 of Applicant's original specification, which are evidence of the unexpected, new property possessed by Applicant's

novel composition.[2] Du Pont v. Phillips Petroleum Co., 7 U.S.P.Q.2d 1129, 1133 (Fed. Cir. 1988).

For all of the above reasons, the Oishi Document fails to teach, or even suggest, each and every limitation recited in claims 1-6, 22-32, 63-66, 81-84, 90-92, 98, 102, 106 and 110-114. Therefore, the Oishi Document is insufficient to, by itself, establish a prima facie case of anticipation, or of obviousness, against any claim of the above-captioned application.

iii. The JP'266 Document

The JP'266 Document[3] discloses a corrosion resistant golden copper alloy that contains gallium and silicon for improved resistance to sea water and inorganic acids (See Exhibit C, of record). More specifically, the JP'266 Document discloses a copper alloy that includes 1-40 wt.% of Ga, and 0.1-15 wt.% Si, and the remainder is copper (See Exhibit C). In a particular embodiment disclosed by the JP'266 Document, the golden-colored alloy includes 13.9 wt.% Ga and 0.8 wt.% Si, and a remainder of Cu (See Exhibit C). As would be instantly appreciated by a person of ordinary skill in the art, both Ga and Si are essential and necessary elements of the alloy.

According to the JP'266 Document, (See Exhibit B, at 168, left col., lines 1-7), there is almost no improvement in corrosion resistance when either Ga (1-40 wt.%) or Si (0.1-15 wt.%) falls below the lower limit of the disclosed ranges for these two elements. In fact, the embodiment alloys nos. 1-7 listed in Table 1 on page 168 of the JP'266 Document each contain both Ga and Si without exception. Therefore, a person of ordinary skill in the art would understand that, according to the disclosure of the JP'266 Document, the mere

[2] Applicant's claimed copper alloy material is plainly novel over the art of record because no prima facie case of anticipation stands against any of Applicant's claims.

[3] The Examiner provided only an Abstract allegedly corresponding to the JP'226 Document (See Office Action, dated February 23, 2010, at 6, line 6-8). Applicant previously filed a copy of JP 49-40226 labeled as "Exhibit B," and Applicant previously filed a copy of an English Abstract corresponding to JP 49-40226, which was labeled as "Exhibit C."

presence of Si without Ga does not have, and/or is not expected to have, any influence on the corrosion resistance of the golden copper alloy.

Therefore, the JP'266 Document does not teach, or suggest, that adding < 1% Si to a copper alloy should increase corrosion resistance of the alloy as the Examiner contends (Office Action, February 23, 2010, at 6, lines 12-15) because the JP'266 Document is limited to golden copper alloys that include both Ga and Si. The Examiner is not certain regarding what portion of Exhibit B supports Applicant's arguments (Office Action, mailed October 1, 2010, at 13, lines 1-2). Applicant points out that it is page 168, left col., lines 1-7, of Exhibit B, which discloses almost no improvement in corrosion resistance when either Ga (1-40 wt.%) or Si (0.1-15 wt.%) falls below its lower limit of the two elements (See also Amendment (D), filed June 23, 2010, at 30, lines 3-10).

In view of the above facts, the Examiner's contention that "the disclosure of JP'266 was simply used to show that addition of Si in copper alloys for corrosion resistance is known" (Office Action, dated October 1, 2010, at 13, lines 8-12) is incorrect because, according to the JP'266 Document, Si provides corrosion resistance only when added with sufficient amounts of Ga to a copper alloy. **The Examiner does not dispute this fact, and implicitly concedes it**. Thus, the JP'266 Document does not teach, or suggest, (i) "one or more elements selected from the group consisting of 0.02 to 1.5 mass% of Al, and 0.02 to 1.9 mass% of Si" because the JP'266 Document discloses the addition of the combination of Si and Ga to improve corrosion resistance.

As admitted by the Examiner (Office Action, mailed October 1, 2010, at 6, lines 1-2), the JP'226 Document does not teach, or suggest, (ii) "the copper alloy material has a phase structure including an α phase, a γ phase, and a δ phase, and the total area ratio of the α, γ, and δ phases is 95 to 100%" as recited by claims 1, 111 and 112. For the same reasons, the JP'226 Document does not teach or suggest the phase structure recited by new claims 113

and 114. The JP'266 Document also does not teach, or suggest, (iii) "the copper alloy material forms an Al-Sn coating or a Si-Sn coating when in seawater" as recited by claims 1 and 111, and (iv) "the copper alloy material has an Al-Sn surface coating or a Si-Sn surface coating" as recited by claim 112.

iv. The Hasegawa Document

The Hasegawa Document discloses an "anticorrosive copper alloy for ocean use" that includes 20-37%, by weight of Zn, 0.05-0.5%, by weight, of Al, 0.05-0.4%, by weight, of Sn, 0.02-0.05%, by weight, of P, wherein the remainder is copper and unavoidable impurities, which is a characteristic of the restraining dezincification phenomenon (See English Translation of Hasegawa, at 2, lines 3-10).

v. Summary of the Disclosures

The Oishi Document discloses a wire made of seawater corrosion resisting copper-base alloy having a composition consisting of, by weight, 62.0-69.0% copper, 0.2-1.0% tin, 0.02-0.15% antimony, one or two elements selected from 0.02-0.15% phosphorus, 0.1-1.0% nickel, and 0.05-0.8% iron, and the balance zinc with inevitable impurities. However, the Oishi Document further discloses that the crawl for cultivation of fishes made by suspending a cultivation net (3) for fishes with plural floats (4) includes sacrificial anodes (5) composed of zinc plates attached to respective corner parts (3b) of the cultivation net (3). The JP'266 Document discloses a golden-colored copper alloy that includes 1-40 wt.% of Ga, and 0.1-15 wt.% Si, and the remainder is copper, wherein the combination of Ga and Si, when added in sufficient amounts together, in the alloy increases improved resistance to sea water and inorganic acids. The Hasegawa Document discloses an anticorrosive copper alloy that

includes 20-37%, by weight of Zn, 0.05-0.5%, by weight, of Al, 0.05-0.4%, by weight, of Sn, 0.02-0.05%, by weight, of P, wherein the remainder is copper and unavoidable impurities

The combination of the Oishi Document, the JP'266 Document, and the Hasegawa Document still does not teach, or even suggest, (i) "the copper alloy material forms an Al-Sn coating or a Si-Sn coating when in seawater" as recited by claims 1 and 111, (ii) "the copper alloy material has an Al-Sn surface coating or a Si-Sn surface coating" as recited by claim 112, and (iii) "the copper alloy material has a phase structure including an α phase, a γ phase, and a δ phase, and the total area ratio of the α, γ, and δ phases is 95 to 100%" as recited by claims 1, 111 and 112. Furthermore, the combination of the Oishi Document, the JP'266 Document, and the Hasegawa Document also does not teach, or suggest, the phase structure recited by new claims 113 and 114.

For all of the above reasons, the combined teachings of the Oishi Document, the JP'266 Document, and the Hasegawa Document fail to teach or suggest each and every limitation of the claimed invention and, therefore, cannot establish a prima facie case of obviousness against amended claims 1-6, 22-32, 63-66, 81-84, 90-92, 98, 102, 106 and 110-114 of the above-captioned application.

a. Additional Comments Regarding the Claimed Invention

The presently claimed invention is directed to a copper alloy material in wire or bar form, such as is used to form a netted structure used in seawater. It also pertains broadly to copper alloys that may be subjected to harsh conditions, such as high-speed moving water (e.g., ocean currents), waves and abrasion. The presently claimed invention aims to improve not only seawater resistance, but also corrosion resistance against waves, winds, and rubbing of materials, namely, corrosion resistance where abrasion in seawater is involved, as well as erosion-corrosion resistance (See, e.g., Applicant's original specification, ¶¶ [0008], [0009],

[0045] and [0046]). In addition, as described in ¶¶ [0034] and [0035] of Applicant's specification, the addition of Al and Si has positive effects on erosion-corrosion resistance in high-speed moving water, and on corrosion resistance under various harsh conditions encountered in seawater. More particularly, as stated in ¶ [0034] of Applicant's specification,

> "a seawater netted structure formed of a large number of wires (particularly fish cultivation net) can be worn out or torn rapidly by seawater or waves running at a high speed, by contact with or hit by cultured fish, or by rubbing of the wires against each other. Al and Si each form a strong, corrosion-resistant Al-Sn or Si-Sn coating over the surface of the wires. The coating enhances the wear resistance of the wires to prevent the wear and tear of the wires as much as possible."

Accordingly, the formation of a corrosion-resistant Al-Sn coating, or a Si-Sn coating, is a necessary property limitation of the copper alloy material of claims 1 and 111, and the corrosion-resistant Al-Sn surface coating, or the Si-Sn surface coating, is a necessary product limitation of the copper alloy material of claim 112. On the other hand, while Mn improves wear resistance of the wires by combining with Si, in accordance with some embodiments of the present invention, Ni by itself improves corrosion resistance. Therefore, the presence of Mn and Ni in the copper alloy material should be differentiated from the presence of Al and Si.

In addition, excellent corrosion resistance under harsh conditions is achieved by the claimed copper alloy material of the invention because the copper alloy material forms a Sn-rich protective coating as the content of Sn increases as described in ¶¶ [0024] and [0025] of Applicant's specification.

vi. The Examiner has Adduced No Legitimate Reason for Combining the Disclosures of the Oishi Document, the JP'266 Document, and the Hasegawa Document, and the Examiner has Established No Reasonable Expectation of Success Even if the Combination Was Made

A proper rejection under Section 103 requires showing (1) that a person of ordinary skill in the art would have had a legitimate reason to attempt to make the composition or device, or to carry out the claimed process, and (2) that the person of ordinary skill in the art would have had a reasonable expectation of success in doing so. PharmaStem Therapeutics, Inc. v. ViaCell, Inc., 491 F.3d 1342, 1360 (Fed. Cir. 2007). In this case, the Examiner has adduced no legitimate reason to justify the combination of the Oishi Document, the JP'266 Document, and Hasegawa Document, and the Examiner has not demonstrated that a person of ordinary skill in the art would have enjoyed a reasonable expectation of success of obtaining Applicant's claimed alloy even if the combination was made.

a. No Legitimate Reason to Combine Oishi, the JP'266 Document, and Hasegawa

The present invention aims to improve erosion-corrosion resistance and corrosion resistance of the copper alloy material itself against ocean waves, winds, and rubbing against materials in seawater, etc. (See, e.g., ¶¶ [0008], [0009], [0045] and [0046] of Applicant's original specification). The copper alloy material, in accordance with the present invention, includes Cu, Sn, one or more elements selected from the group consisting of Al and Si, and a remainder of Zn, wherein the copper alloy material has excellent seawater resistance. The alloy disclosed by the Oishi Document includes Cu, Sn, Sb, one or more elements selected from the group consisting of P, Ni and Fe, and the remainder is Zn. As admitted by the Examiner, the Oishi alloy does not include Si. The JP'266 Document discloses a golden-

colored alloy that includes Cu with both Ga and Si added to improve resistance to seawater and inorganic acids. In view of the above facts, **a person of ordinary skill in the art would have absolutely no reason whatsoever to add only Si to the alloy disclosed by the Oishi Document in the hopes of improving corrosion resistance**. Thus, while the Examiner may arguably employ the JP'266 Document as justification to add both Ga and Si together to improve corrosion resistance, the Examiner has failed to justify adding only Si, without Ga, to improve corrosion resistance. Therefore, the combination of the Oishi Document, the JP'266 Document, and the Hasegawa Document would result in a copper alloy that includes substantial amounts of Ga. Such an alloy is a substantially different alloy from the alloy recited by claims 1, 111 and 112 of the above-captioned application.

For all of the above reasons, the Examiner has failed to establish a legitimate reason to justify combining and modifying the subject matter disclosed by the Oishi Document, the JP'266 Document, and the Hasegawa Document.

b. No Reasonable Expectation of Success of Obtaining Applicant's Claimed Invention Even if the Combination of Oishi, the JP'266 Document, and Hasegawa is Made

In addition, a person of ordinary skill in the art would not have enjoyed a reasonable expectation of success of obtaining an alloy in accordance with the present invention even if the modification asserted by the Examiner was made because a person of ordinary skill in the art would expect that both Ga and Si together must be added to Cu in order to achieve improvements in resistance to sea water and inorganic acids. Thus, the Ga-containing copper alloy resulting from the combination of the Oishi Document, the JP'266 Document, and the Hasegawa Document is a substantially different alloy from the claimed "copper alloy material" so that a person of ordinary skill in the art would have had absolutely no reasonable

expectation of success with respect to obtaining a "copper alloy material" wherein "the copper alloy material has a phase structure including an α phase, a γ phase, and a δ phase, and the total area ratio of the α, γ, and δ phases is 95 to 100%" as recited by claims 1, 111 and 112, even if the combination asserted by the Examiner was made. For the same reasons, a person of ordinary skill in the art would have absolutely no reasonable expectation of success of obtaining a "copper alloy material" as claimed that possesses the phase structure recited by claims 113 and 114.

Furthermore, a person of ordinary skill in the art would also have absolutely no reasonable expectation of success of obtaining a "copper alloy material" as claimed wherein "the copper alloy material forms an Al-Sn coating or a Si-Sn coating when in seawater" as recited by claims 1 and 111, and "the copper alloy material has an Al-Sn surface coating or a Si-Sn surface coating" as recited by claim 112.

The present application discloses that a Sn-rich coating forms on the surface of the copper alloy material of the invention because of the increased Sn content (Applicant's original specification, at ¶¶ [0024] and [0025]). Also described is the formation of a corrosion-resistant Al-Sn or Si-Sn coating over the surface of the wires (Applicant's original specification, at ¶¶ [0034] and [0035]). The Oishi Document, on the other hand, is silent about the presence of Al or Si. Those skilled in the art would not have had any reasonable expectation of obtaining a copper alloy that forms an Al-Sn or Si-Sn coating when in sea water even if the combination of the Oishi Document, the JP'266 Document, and the Hasegawa Document was made because each of these three documents is completely silent regarding the formation of an Al-Sn or Si-Sn coating when the alloy is placed in sea water. For the same reasons, a person of ordinary skill in the art would have no expectation of achieving the degree of corrosion resistance under harsh conditions achieved by the formation of corrosion resistant Al-Sn and Si-Sn coating of the present invention by

combining the disclosures of the Oishi Document, the JP'266 Document, and the Hasegawa Document.

For all of the above reasons, the Examiner has failed to establish a prima facie case of obviousness against any claim of the above-captioned application.

c. The Examiner's Impermissible Retrospective View of Inherency with Respect to the Claimed Phase Structure Should be Withdrawn

The Examiner admits that neither the Oishi Document nor the JP'266 Document teaches, either explicitly or inherently, that "the copper alloy material has a phase structure including an α phase, a γ phase, and a δ phase, and the total area ratio of the α, γ, and δ phases is 95 to 100%," as recited by claims 1, 111 and 112 (See Office Action, mailed October 1, 2010, at 6, lines 1-2). The Examiner does not allege that the Hasegawa Document inherently discloses the claimed phase structure. Furthermore, Applicant contends that the Hasegawa Document is silent with respect to the claimed phase structure, and that the claimed phase structure is not inherent to the subject matter disclosed by the Hasegawa Document.

The Examiner erroneously contends that

> "since Oishi in view of Furukawa and in view of Hasegawa teaches an overlapping composition and a substantially similar method of preparation by melt-solidification, rolling, casting, as shown in instant specification pars. 17, 21, 30, etc., the phases and the total area ratios as claimed would be expected in the alloy of Oishi in view of Furukawa and in view of Hasegawa. See MPEP 2112.01."
>
> (Office Action, dated October 1, 2010, at 6, lines 1-7).

The Examiner's contention is erroneous because the MPEP is not the law. According to the Federal Circuit, the doctrine of inherency cannot be applied to a hypothetical legal construct resulting from a combination of disclosures because such a "retrospective view of inherency"

is based on that which is not necessarily known. In re Newell, 13 U.S.P.Q. 1248, 1250 (Fed. Cir. 1989). In In re Newell, 13 U.S.P.Q. at 1250, the Federal Circuit refused to apply the doctrine of inherency to a device resulting from the combination of multiple prior art devices because, according to the court, obviousness cannot be predicated on the unknown.

In this case, there is no dispute that the claimed "copper alloy material" is novel. Furthermore, there is no dispute that neither the Oishi Document, nor the JP'266 Document, nor the Hasegawa Document discloses, either explicitly or inherently, the claimed copper alloy material having the claimed phase structure. None of these documents disclose the claimed phase structure, and the copper alloy material resulting from the combination of the Oishi Document, the JP'266 Document, and the Hasegawa Documents is not prior art. Rather, it is a hypothetical construct created by the Examiner as a legal argument. In accordance with the Federal Circuit's decision in In re Newell, 13 U.S.P.Q. at 1250, the Examiner cannot apply the doctrine of inherency to the hypothetical construct.

To the extent the Examiner relies on In re Spada, 15 U.S.P.Q.2d 1655, 1657-58 (Fed. Cir. 1990), for the proposition that a chemical composition and its properties are inseparable so that a composition made from identical components as the invention, and made using the same or similar techniques as the invention, should produce products having the identical composition as the invention, and the same properties of the invention, absent evidence to the contrary, Applicant objects. The Federal Circuit in In re Spada, 15 U.S.P.Q.2d 1655, 1657-58, applied the doctrine of inherency to subject matter disclosed by a single prior art reference. The Federal Circuit in Spada did not apply the doctrine of inherency to a hypothetically created construct formed by combining subject matter from multiple prior art documents. Therefore, the Federal Circuit's holding in Spada cannot be applied to the facts of this case. On the contrary, the Examiner must abide by the Federal Circuit's ruling in

Newell, which prohibits the application of the doctrine of inherency to subject matter resulting from a combination of prior art disclosures.

In sum, the Examiner cannot apply the doctrine of inherency to the copper alloy material resulting from the combination of three different disclosures, including the Oishi Document, the JP'266 Document, and the Hasegawa Document, because such a retrospective view of inherency is based on the unknown and is not permitted. Because the Examiner's inherency argument is untenable and must be withdrawn, it is evident that the combination of the Oishi Document, the JP'266 Document, and the Hasegawa Document, fails to teach or suggest, that "the copper alloy material has a phase structure including an α phase, a γ phase, and a δ phase, and the total area ratio of the α, γ, and δ phases is 95 to 100%," as recited by claims 1, 111 and 112. Therefore, the Examiner has failed to establish a prima facie case of obviousness against any claim of the above-captioned application.

d. The Examiner has not Properly Considered the Surface Coating Limitations of Independent Claims 1, 111 and 112

The Examiner contends that the limitation wherein "the copper alloy material forms an Al-Sn coating or a Si-Sn coating when in seawater," as recited by claims 1 and 111, is a "product-by-process" limitation that has not been considered on its merits (Office Action, dated October 1, 2010, at 6, line 14, to 7, line 2). The Examiner's contention that the alleged "product-by-process" limitation should not be given any patentable weight is at odds with the Federal Circuit's decision in Abbott Laboratories v. Sandoz, Inc., 56 F.3d 1282, 1295-96 (Fed. Cir. 2009), in which the court held that product-by-process claims limit the invention to the claimed process. Therefore, **assuming *arguendo* that the limitation pertaining to "the copper alloy material forms an Al-Sn coating or a Si-Sn coating when in seawater" is a "product-by-process" limitation (which is an invalid assumption), the Examiner's**

obviousness rejection is untenable on its face because the Examiner failed to give the limitation patentable weight.

However, the Examiner's contention that the coating limitation is a product-by-process limitation is fundamentally flawed because the limitation wherein "the copper alloy material forms an Al-Sn coating or a Si-Sn coating when in seawater" is a property limitation of the copper alloy material. The Federal Circuit has ruled that a claimed composition may be defined, in part, by property limitations. Du Pont v. Phillips Petroleum Co., 7 U.S.P.Q.2d 1129, 1133 (Fed. Cir. 1988). It is evident on its face that the limitation wherein "the copper alloy material forms an Al-Sn coating or a Si-Sn coating when in seawater" is a property limitation, and not a product-by-process limitation, because the limitation pertains to the behavior of the claimed copper alloy material when it is in seawater. The property limitation of the copper material alloy pertains to the characteristic that, in accordance with the present invention, the copper alloy material must form a protective coating of either Al-Sn or Si-Sn on its surface when placed in seawater. Claims 1 and 111 do not describe a method for making the claimed copper alloy material or its composition.

With respect to claim 112, this claim recites "the copper alloy material has an Al-Sn surface coating or a Si-Sn surface coating," which is a pure product limitation. This limitation is plainly neither a property limitation nor a product-by-process limitation.

For all of the above reasons, **the limitation pertaining to a "copper alloy material [that] forms an Al-Sn coating or a Si-Sn coating when in seawater," as recited by claims 1 and 111, is a property limitation of the copper alloy material, and not a product-by-process limitation. Thus, when it is properly construed, and considered, the Examiner should conclude that the combined disclosures of the Oishi Document, the JP'266 Document, and the Hasegawa Document, completely fail to teach, or suggest, a "copper alloy material [that] forms an Al-Sn coating or a Si-Sn coating when in seawater" as**

recited by claims 1 and 111. The Examiner should also conclude that the combined disclosures of the Oishi Document, the JP'266 Document, and the Hasegawa Document, do not teach, or suggest, the pure product limitation recited by claim 112 pertaining to "the copper alloy material has an Al-Sn surface coating or a Si-Sn surface coating."

For all of the above reasons, the Examiner has failed to establish a prima facie case of obviousness against any claim of the above-captioned application.

vii. Applicant's Evidence of Superior and Unexpected Results

When an applicant adduces specific data demonstrating substantially improved results, and states that the results are unexpected, then in the absence of evidence to the contrary, applicant has established unexpected results sufficient to prove the invention is nonobvious. In re Soni, 34 U.S.P.Q.2d 1684, 1687-88 (Fed. Cir. 1995). The invention need only be compared to the closest prior art, In re Johnson, 223 U.S.P.Q. 1260, 1264 (Fed. Cir. 1984), however, it is acceptable to compare the invention to subject matter that is closer to the invention than the closest prior art. Ex parte Humber, 217 U.S.P.Q. 265, 266 (Bd. Pat. App. & Inter. 1981). Assuming *arguendo* that the Examiner has established a prima facie case of obviousness (which is a completely invalid assumption), Applicant has provided, in his specification, evidence of the superior and unexpected corrosion resistance achieved by the copper alloy material of the invention that is sufficient to overcome any alleged prima facie case.

As is known in the art, corrosion resistance of any material, under harsh conditions prevalent in the ocean, for example, occurs by various forms such as pitting, erosion-corrosion, cavitation and selective corrosion. Corrosion resistance is also affected by the usage environment, such as, for example, whether the material is used in running or moving water versus in stagnant water, or whether the material is used in a high temperature

environment or at room temperature, or whether the material is used in seawater or fresh water, or whether the material is subjected to physical action (i.e., rubbing) or not, and so on. It is also known in the art that each alloying element may have its own effect or influence on a different type of corrosion.

As discussed above, the copper alloy material of the invention exhibits excellent corrosion resistance under various harsh conditions encountered in seawater due to the formation of Al-Sn and Si-Sn coatings while in use in seawater. However, this excellent corrosion resistance occurs provided that the necessary conditions in connection with the metal structure are present (i.e., the recited limitations with respect to alpha, gamma, delta, and other phases are met), and provided that the relationships Y1 to Y4 and Y9 are satisfied, which pertain to relationships between the contents of various alloying elements, namely, Cu, Sn, and so forth. The effect of the contents of such elements, such as Al and Si, is demonstrated by examples presented as shown in Tables 1 and 6 of Applicant's disclosure as originally filed.

In particular, example alloy nos. 301 to 305 and 401 to 404, which contain Sn and Al and/or Si, exhibit better corrosion resistance results in the harsh erosion-corrosion test compared to example alloy nos. 101 and 206 without Al and/or Si (See Tables 1 and 6 of Applicant's disclosure). The erosion-corrosion test is performed in seawater to evaluate corrosion resistance under actual usage environments and is described in ¶¶ [0067] and [0068] of the above-captioned application.

As evident from Applicant's Tables 1 and 6, the average wear loss for example alloy nos. 101 to 206 is 27 mg/cm^2, 137 mg/cm^2, 77 mg/cm^2, and 294 mg/cm^2, under the test conditions of Test Condition I, of Test Condition II, of Test Condition III, and of Test Condition IV, respectively. On the other hand, the loss of example alloy nos. 301 to 305 and 401 to 404 is 25 mg/cm^2, 112 mg/cm^2, 65 mg/cm^2, and 229 mg/cm^2, under Test Conditions

I to IV, respectively, revealing that the alloy nos. 301 to 305 and 401 to 404 are clearly substantially improved with respect to erosion-corrosion resistance. The difference between the present invention and subject matter closer to that of the present invention than the closest art of record (i.e., the Oishi Document) is more pronounced when the conditions are harsher. Furthermore, this substantially improved erosion-corrosion resistance exhibited by alloys of the present invention was unexpected.

In addition, example alloy no. 201 in Table 1 of the above-captioned application consists of Cu:62.6-Sn:0.8-Sb:0.08-Zn:36.5 and is not an alloy in accordance with the presently claimed invention. Example alloy no. 202 in Table 1 consists of Cu:63.4-Sn:0.5-Sb:0.07-Zn:36.0 and is also not an alloy in accordance with the presently claimed invention. Alloy nos. 201 and 202 are *de facto* comparative alloys that are substantially similar to the alloy disclosed by the Oishi Document. Therefore, the erosion-corrosion test data obtained for example alloy nos. 201 and 202, more likely than not, reflects the erosion-corrosion characteristics exhibited by the alloy disclosed by the Oishi Document.

The erosion-corrosion test results for example alloy no. 201, compiled from Table 6 of the above-captioned application, are as follows: 35 mg/cm^2, 202 mg/cm^2, 113 mg/cm^2, and 348 mg/cm^2, under the test conditions of Test Condition I, of Test Condition II, of Test Condition III, and of Test Condition IV, respectively. The erosion-corrosion test results for example alloy no. 202, compiled from Table 6 of the above-captioned application, are as follows: 28 mg/cm^2, 145 mg/cm^2, 79 mg/cm^2, and 313 mg/cm^2, under the test conditions of Test Condition I, of Test Condition II, of Test Condition III, and of Test Condition IV, respectively. These results are substantially inferior to those for example alloy nos. 301 to 305 and 401 to 404 of the present invention. In fact, all of the nine alloys, from example alloy nos. 301 to 305 and 401 to 404, show lower wear loss than example alloy nos. 201 and 202 <u>in every tested condition</u>.

In view of the substantially improved and unexpected erosion-corrosion resistance of the invention alloys compared to example alloy nos. 201 and 202 (which is substantially similar to the alloy disclosed by the Oishi Document), Applicant has shown a clear, substantial difference between the invention alloys as claimed and the alloys disclosed by the Oishi Document (i.e., the closest prior art). Accordingly, although corrosion resistant may also depend on other factors such as (i) metal structure, (ii) Sn content, and (iii) the relationships between Cu, Sn and the other alloying elements, a person of ordinary skill in the art should still conclude that the presence of Al and/or Si in a small amount unexpectedly imparts excellent corrosion resistance under conditions equivalent to the erosion-corrosion test, which represents how the alloy material should be affected by sea water, or by ocean waves moving at high speed, or by rubbing of wires made of the alloy against one another.

In sum, assuming *arguendo* that the Examiner has established a prima facie case of obviousenss against Applicant's claimed invention (which is an invalid assumption), Applicant's evidence of substantially superior and unexpected erosion-corrosion resistance with respect to example alloy nos. 201 and 202 (which are substantially similar to the alloy disclosed by the Oishi Document) is sufficient to overcome the alleged prima facie case.

a. The Examiner's Objections to Applicant's Data are Untenable and Should be Withdrawn

The Examiner contends that the copper alloy resulting from the combination of the Oishi Document, the JP'266 Document, and the Hasegawa Document may yield the same results as Applicant's claimed alloy (Office Action, dated October 1, 2010, at 15, lines 10-17). The Examiner's contention is fundamentally flawed because Applicant need compare the invention only to the closest prior art, In re Johnson, 223 U.S.P.Q. 1260, 1264 (Fed. Cir. 1984). Applicant contends that the Oishi Document is the closest prior art. **The Examiner**

has not rebutted Applicant's argument and, therefore, implicitly concedes that the Oishi Document is the closest prior art. Applicant has demonstrated substantially superior and unexpected results by comparing erosion-corrosion data for Alloy Nos. 201 and 202 (which are Cu-Sn-Zn-Sb alloy similar to Cu-Sn-Zn-Sb alloy disclosed by the Oishi Document, Table No. 1, Alloy No. 1) with erosion-corrosion data for Alloy Nos. 301 to 305 and 401 to 404 (representing the presently claimed invention). The Examiner argued that one data point was insufficient, even though the Examiner conceded that the erosion-corrosion characteristics of Alloy No. 202 (the single data point) was inferior to Alloy Nos. 301 to 305 and 401 to 404 (Office Action, dated October 1, 2010, at 15, lines 10-15). Applicant's data actually includes two data points showing the superior and unexpected erosion-corrosion properties, as discussed above.

The Examiner objected to Alloy No. 202 because it is "Applicant's own alloy" and not the closest prior art (Office Action, dated October 1, 2010, at 15, lines 16-17). The Examiner's contention is flawed because Applicant may also compare the invention to subject matter that is closer to the invention than the closest prior art. Ex parte Humber, 217 U.S.P.Q. 265, 266 (Bd. Pat. App. & Inter. 1981). Applicant has done so by comparing wear data for Alloy Nos. 101 to 206 with wear data for Alloy Nos. 301 to 305 and 401 to 404 (representing the presently claimed invention). Applicant contends that Alloy Nos. 201 and 202 are similar to those of the Oishi Document as discussed above, and that the remaining Alloy Nos. 101 to 206 represent alloys that are closer to Applicant's claimed invention than subject matter disclosed by the Oishi Document. The fact that Alloy Nos. 101 to 206 pertain to first and second embodiment alloys, whereas Alloy Nos. 301 to 305 and 401 to 404 pertain to third and fourth embodiment alloys (See Applicant's specification, ¶¶ [0011]-[0014]) and [0034]), does not preclude Applicant from demonstrating unexpected and superior erosion-

corrosion properties of the third and fourth embodiment alloys (which are presently claimed) over Applicant's own first and second embodiment alloys.

With respect to the "alloy" resulting from the combination of the Oishi Document, the JP'266 Document, and the Hasegawa Document, Applicant points out that this is not a prior art alloy. As discussed above, it is a hypothetical construct created by the Examiner as a legal argument. Applicant has no obligation to compare the invention to the Examiner's hypothetical alloy. See, e.g., In re Geiger, 2 U.S.P.Q.2d 1276, 1279 (Fed. Cir. 1987)(concurring opinion). Furthermore, it is a well-settled proposition that an applicant is not required to compare the invention to the invention. In re Chapman, 148 U.S.P.Q. 711, 714 (C.C.P.A. 1966).

For all of the above reasons, Applicant has compared the invention to subject matter similar to the closest prior art, namely, the Cu-Sn-Zn-Sb alloy disclosed by the Oishi Document, and Applicant has compared the invention to subject matter that is closer to the invention than the closest prior art (i.e., the Oishi Document). Applicant's data demonstrates substantially superior and unexpected erosion-corrosion resistance over the alloys used in the comparison. Therefore, assuming that a prima facie case of obviousness had been established in this case (which is an invalid assumption), Applicant has provided evidence of substantially superior and unexpected results sufficient to overcome the alleged prima facie case.

b. The Examiner's "Key Variable" Argument is Untenable and Should be Withdrawn

The Examiner argues that Applicant's data in Tables 1 and 6 fails to show unexpected results because there are "key variables," such as Sb content, that are not claimed (Office Action, dated October 1, 2010, at 15, lines 18-22). The Examiner's argument is flawed

because the tested alloys representing the claimed invention all fall within the scope of the claims. The Examiner has failed to demonstrate that Alloy Nos. 301 to 305 and 401 to 404 do not fall within the scope of the claims.

Applicant points out that Sb, for example, is a necessary element in accordance with certain embodiments of the invention. However, Sb can, in accordance with other embodiments of the present invention, be replaced with As (See, e.g., Applicant's specification, ¶¶ [0031] and [0032]), or P (See, e.g., Applicant's specification, ¶¶ [0033] and [0034]). Applicant's Table 1 shows that (1) Alloy Nos. 201 and 202 fall within the scope of alloys disclosed by the Oishi Document, and contain Sb but not Al or Si, (2) Alloy Nos. 301 to 304 contain Al and Si, but not Sb, As, or P, and (3) Alloy Nos. 305 and 401 to 404 contain Sb, As and P in addition to Al and Si. Apart from Alloy No. 202, all the alloys contain more than 0.6% Sn. When comparing the results of the erosion-corrosion test, the wear loss of Alloy Nos. 201 and 202 (which are equivalent to alloy of the Oishi Document) is the highest, and almost 1.5 times as high compared to the alloys containing Al and Si. The wear loss of Alloy Nos. 301 to 304, which contain Al and Si, but not Sb, As or P, is 1.05 to 1.1 times as high as Alloy Nos. 305 and 401 to 404, which contain Al, Si, Sb, As and P. Therefore, it is shown by the data that the effect regarding improving erosion-corrosion resistance under high-speed moving water conditions, by adding Al and/or Si, is substantial. It is also understood from Alloy Nos. 305 and 401 to 404 that while Sb, As and P are all effective for improving erosion-corrosion resistance, Sb is not a "key variable" or necessary element because either Sb, As, or P, may be included in alloys of the presently claimed invention (See, e.g., Applicant's claim 2).

c. The Examiner's Allegation that the Alloy Resulting from the Combination of Oishi, the JP'266 Document, and HasegawaWould Inherently Possess Certain Erosion-Corrosion Resistance Properties is Untenable and Should be Withdrawn

The Examiner argues that the "alloy" resulting from combining the Oishi Document, the JP'266 Document, and the Hasegawa Document would inherently possess the same erosion-corrosion resistance as exhibited by Applicant's claimed alloys (Office Action, dated October 1, 2010, at 16, line 16, to 17, line 2). The Examiner's argument is flawed on its face because the alleged "alloy" is not prior art; rather, it is a hypothetical construct or legal argument. Therefore, in accordance with the Federal Circuit's holding in In re Newell, 13 U.S.P.Q. at 1250, the Examiner cannot employ the inherency doctrine to support a prima facie case of obviousness. Secondly, because the "alloy" resulting from the Examiner's combination of the Oishi Document, the JP'266 Document, and the Hasegawa Document is not prior art, Applicant does not have to compare the claimed alloys to this hypothetical alloy in order to establish patentability. See, e.g., In re Geiger, 2 U.S.P.Q.2d 1276, 1279 (Fed. Cir. 1987)(concurring opinion). Applicant only has to compare the invention to the closest prior art, In re Johnson, 223 U.S.P.Q. 1260, 1264 (Fed. Cir. 1984), and Applicant has done so and more.

For all of the above reasons, the Examiner's arguments, regarding what properties the hypothetical alloy resulting from the Examiner's combination of Oishi, the JP'266 Document, and Hasegawa might have, are untenable and must be withdrawn.

d. Additional Comments Regarding the Difficulty a Person of Ordinary Skill in the Art Would Have Regarding Predicting Erosion-Corrosion Resistance of a Hypothetical Alloy

Applicant contends that a person of ordinary skill in the art would not have been able to predict the erosion-corrosion properties of the hypothetical alloy created by the Examiner as a legal argument because the erosion-corrosion properties of alloys are complex, and depends upon multiple variables (See, e.g., Metals and Corrosion Resistance, downloaded from http://www.engineeringtoolbox.com/metal-corrosion-resistance-_..., on January 14, 2011, 4 pages, a copy of which is filed herewith as "Exhibit A2"). More specifically, as would be known by those of ordinary skill in the art, the corrosion resistance of any material, under harsh conditions prevalent in the ocean, for example, occurs by various forms such as pitting, erosion-corrosion, cavitation and selective corrosion (See, e.g., Fundamentals of Corrosion and Corrosion control, downloaded from http://corrosion.ksc.nasa.gove/corr_fundamentals.htm, on January 14, 2011, 2 pages, and Why Metals Corrode, downloaded from http://corrosion.ksc.nasa.gove/corr_metal.htm, on January 14, 2011, 2 pages, and Forms of Corrosion, http://corrosion.ksc.nasa.gove/corr_forms.htm, on January 14, 2011, 3 pages, which are collectively filed herewith as "Exhibit A3;" and see also Eight Forms of Corrosion, downloaded from http://corrosion-doctors.org/Corrosion-History/Eight.htm, on January 14, 2011, 4 pages, a copy of which is filed herewith as "Exhibit A4"). Corrosion resistance is also affected by the usage environment, such as whether the material is used in a high temperature environment or at room temperature, or whether the material is used in sea water or fresh water, or whether the material is subjected to physical action or not, and so on (See,

e.g., Exhibit A2). Furthermore, it is known in the art that each alloying element may have its own effect or influence on a different type of corrosion (See, e.g., Exhibit A2).

As discussed above, the metal alloy disclosed by the JP'266 Document achieves excellent corrosion resistance in stagnant water (which is not erosion-corrosion resistance) only by the co-addition of Ga and Si. In other words, the JP'266 Document does not disclose good corrosion resistance by the single addition of Si. Furthermore, **the corrosion resistance disclosed by the JP'266 Document pertains to uniform corrosion (general corrosion) and it does not necessarily correlate to erosion-corrosion resistance** (See, e.g., Exhibit A3 and Exhibit A4). Furthermore, the corrosion resistance disclosed by the JP'266 Document is obtained by adding both Ga and Si together to Cu, which does not necessarily mean that good corrosion resistance is exhibited in Cu-Zn alloy and/or Cu-Sn-Zn alloy of the above-captioned application.

As mentioned above, a person of ordinary skill in the art would not expect a material having good uniform or general corrosion resistance in stagnant water to necessarily have excellent erosion-corrosion resistance as well (See, e.g., Exhibits A3 and A4). As is known in the art, erosion-corrosion is a particularly aggressive form of corrosion that is due to the combination of an aggressive chemical environment and high fluid surface velocities (See, e.g., Exhibit A3, page 2, and Exhibit A4, page 3). As disclosed by Exhibit A4, page 3, a material's susceptibility to erosion-corrosion may not be discovered based on corrosion tests run under static conditions.

As a common example of how complicated corrosion properties of a metal are, those skilled in the art know very well that, for a stainless steel, the addition of Ni:8% and Cr:18% to Fe imparts excellent corrosion resistance to the steel, but if one were to add only Ni:8% and no Cr, then there is almost no effect whatsoever on the corrosion resistance of the Fe due to the addition of only Ni. In other words, the difference is whether the Ni is added to an Fe

base metal or to an Fe-Cr base metal. In addition, corrosion resistance of Fe and Fe-Cr alloy is not improved by the addition of Mo:2%. On the contrary, the addition of Mo:2% improves pitting corrosion resistance of Fe-18Cr-8Ni significantly. For copper alloys, Cu-Ni base alloy comes to have greatly improved cavitation resistance by the addition of Fe:1.5%; however, the addition of Fe:1.5% to Cu and Cu-Zn alloy has no effect on cavitation resistance of the base alloy, but does deteriorate corrosion resistance of the base alloy in air and in acid liquid.[4]

Accordingly, regardless whether one is dealing with Cu alloys or Fe alloys, different corrosion effects are shown for different alloys (See, e.g., Exhibit A2). Alloying elements should be selected depending on the forms and types of corrosion, and on the usage environment, and the metallurgist must consider the fact that the combination of two alloying elements together may have an effect on corrosion resistance that neither alloying element alone would produce.

In view of the above facts, the Examiner's contention that the alloy resulting from the combination of the Oishi Document, the JP'266 Document, and the Hasegawa Document would inherently possess certain phase structures and erosion-corrosion properties is not only an impermissible application of the inherency doctrine in view of the Federal Circuit's ruling in In re Newell, 13 U.S.P.Q. at 1250, the argument is also unreasonable.

For all of the above additional reasons, the Examiner's arguments regarding inherent properties of the hypothetical alloy resulting from the combination of the Oishi Document, the JP'266 Document, and the Hasegawa Document are untenable and should be withdrawn.

IV. CONCLUSION

In view of the present amendment, claims 1-6, 22-32, 63-66, 81-84, 90-92, 98, 102, 106 and 110-114, as amended, are in compliance with 35 U.S.C. § 112. In addition, the

[4] This fact is based on the personal knowledge of the inventor.

Examiner has failed to establish a prima facie case of obviousness against any claim of the above-captioned application because the combination of the Oishi Document, the JP'266 Document, and the Hasegawa Document fails to teach or suggest, (i) "the copper alloy material has a phase structure including an α phase, a γ phase, and a δ phase, and the total area ratio of the α, γ, and δ phases is 95 to 100%" as recited by claims 1, 111 and 112, (ii) "the copper alloy material forms an Al-Sn coating or a Si-Sn coating when in seawater" as recited by claims 1 and 111, and (iii) "the copper alloy material has an Al-Sn surface coating or a Si-Sn surface coating" as recited by clam 112. The Examiner has also failed to establish a prima facie case of obviousness against the claims of the above-captioned application because the Examiner has failed to establish any legitimate reason for combining the disclosures of the Oishi Document, the JP'266 Document, and the Hasegawa Document, and because the Examiner has failed to demonstrate that a person of ordinary skill in the art would have enjoyed a reasonable expectation of success of obtaining Applicant's claimed invention even if the combination asserted by the Examiner was made. In addition, Applicant has provided, in the originally filed disclosure of the above-captioned application, evidence of unexpectedly and substantially superior erosion-corrosion resistance that is achieved by copper alloy material of the presently claimed invention over alloy corresponding to alloy disclosed by the Oishi Document, which is the closest prior art, and to alloy that is closer to the claimed invention than the alloy disclosed by the Oishi Document. Therefore, even if the Examiner has established a prima facie case of obviousness (which the Examiner has not done), Applicant's evidence of substantially superior and unexpected results is sufficient to overcome the alleged prima face case and demonstrate the patentability of the pending claims, as amended.

For all of the above reasons, claims 1-6, 22-32, 63-66, 81-84, 90-92, 98, 102, 106 and 110-14 are in condition for allowance, and a prompt notice of allowance is earnestly solicited.

The below-signed attorney for Applicant welcomes any questions.

Respectfully submitted,

GRIFFIN & SZIPL, P.C.

W Scott Reg # 47,395

for Joerg-Uwe Szipl
Registration No. 31,799

GRIFFIN & SZIPL, P.C.
Suite PH-1
2300 Ninth Street, South
Arlington, VA 22204

Telephone: (703) 979-5700
Facsimile: (703) 979-7429
Email: GandS@szipl.com
Customer No.: 24203